

## **REMARKS**

### **Amendments**

Claims 1, 2, and 4-19 are amended to use language in accordance with conventional US practice. Also, claim 1 is amended to recite that the amine is aminoethanol or ethylenediamine. As a result, claim 3 is cancelled and claims 4 and 5 are amended to recite that the amine is aminoethanol and ethylenediamine, respectively. Also, claim 1 is amended to recite that it is a process for producing nonporous spherical particles. See, e.g., page 3, lines 6-11. In addition, claim 19 is amended to recite a material, rather than a “use.”

New claims 20-28 are directed to further aspects of the invention and are supported throughout the disclosure. See, for example, the original claims, and page 5, lines 17-28.

### **Claim Objections**

The claims are amended to delete “characterized” and to change “solubilisers” to solubilizers. Withdrawal of the claimed objections is respectfully requested.

### **Rejection under 35 USC 112, second paragraph**

Claims 6, 12-16 and 19 are rejected under 35 USC 112, second paragraph, as allegedly being indefinite. This rejection is respectfully traversed.

Claim 6 is amended to delete reference to a preferred weight percent range. The definition of A<sup>1</sup> in claim 12 is amended to refer to a divalent alkylene group, rather than a monovalent alkyl group. Additionally, claim 19 is amended to claim a material rather than a use.

Withdrawal of the rejection under 35 USC 112, second paragraph is respectfully requested.

### **Rejection under 35 USC 101**

Claim 19 is rejected under 35 USC 101. As noted above, claim 19 is converted from a “use” claim into a material claim. Withdrawal of the rejection is respectfully requested.

### **Rejection under 35 USC 102(b) in view of Anselmann et al.**

Claims 1-2 are rejected as allegedly being anticipated under 35 USC 102(b) in view of

Anselmann et al. (US 6,302,926). This rejection is respectfully traversed.

Anselmann et al. disclose preparations comprising 70 to 95% by weight of monodisperse spherical oxide particles that have particle diameters of 10 nm - 10  $\mu$ m, and 30 to 5% by weight of an essentially non-volatile binder in the form of a free-flowing powder of agglomerates having diameters of 1  $\mu$ m - 500  $\mu$ m. See column 2, lines 1-8.

Anselmann et al. also describe a two-stage process for preparing SiO<sub>2</sub> particles wherein first a sol or a suspension of primary particles is prepared by hydrolytic polycondensation of tetraalkoxysilanes in an aqueous-alcoholic-ammoniacal medium. Next, the particles are brought to a desired final size by metered addition of tetraalkoxysilane. See column 3, lines 3-8.

Anselmann et al. do not disclose a process wherein hydrolytic polycondensation of tetraalkoxysilanes and/or organotrialkoxysilanes is performed in a medium comprising water, one or more solubilizers, and an amine, namely aminoethanol or ethylenediamine.

Thus, Anselmann et al. fail to anticipate applicant's claimed invention. Withdrawal of the rejection is respectfully requested.

**Rejection under 35 USC 102(b) in view of Unger et al.**

Claims 1, 2, 7-9, and 17-18 are rejected as allegedly being anticipated under 35 USC 102(b) in view of Unger et al. (US 4,775,520). This rejection is respectfully traversed.

Like Anselmann et al. discussed above, Unger et al. disclose a method for the preparation of spherical SiO<sub>2</sub> particles by hydrolytic polycondensation of tetraalkoxysilanes in an aqueous/alcoholic ammoniacal medium. In a first step, a sol of primary particles is produced. Then, the SiO<sub>2</sub> particles obtained are converted to the desired size by a continuous measured addition of tetraalkoxysilane. See, for example, column 3, lines 5-16.

Unger et al. do not disclose a process wherein hydrolytic polycondensation of tetraalkoxysilanes and/or organotrialkoxysilanes is performed in a medium comprising water, one or more solubilizers, and an amine, namely aminoethanol or ethylenediamine.

Thus, Unger et al. fail to anticipate applicant's claimed invention. Withdrawal of the rejection is respectfully requested.

**Rejection under 35 USC 102(b) in view of Trau et al.**

Claims 1 and 10-18 are rejected as allegedly being anticipated under 35 USC 102(b) in view of Trau et al. (US 2003/0124564). This rejection is respectfully traversed.

The rejection refers to paragraphs [0010]-[0012] of Trua et al. In this portion of the disclosure, Trau et al. describe the method for synthesizing colloidal silica known as the Stober process. In this process, tetraethyl orthosilicate is subjected to hydrolysis in a solution of ethanol, water, and ammonia. The hydrolysis of tetraethyl orthosilicate forms reactive silanol groups, and the silanol groups condense to form a polymer chain. As the polymer chain increases, polymer solubility decreases and the polymer precipitates as colloiddally unstable, nano-sized, silica particles. These particles aggregate to form larger particles that are monodisperse.

Trau et al. also disclose that in the Stober process fluorescent dyes can be incorporated into the silica network via silane coupling agents, such as 3-aminopropyl trimethoxysilane. (APS), that react with isothiocyanate modified dyes to form fluorescent silane monomers.

At paragraph [0013], Truc et al. disclose disadvantages associated with the Stober process. Truc et al. state that the particles obtained are limited to a maximum size of about 3 microns, and the resultant particles have limited porosities.

Truc et al. do not disclose a process wherein hydrolytic polycondensation of tetraalkoxysilanes and/or organotrialkoxysilanes is performed in a medium comprising water, one or more solubilizers, and an amine, namely aminoethanol or ethylenediamine. Thus, Truc et al. fail to anticipate applicant's claimed invention. Withdrawal of the rejection is respectfully requested.

Further, it is noted that in applicant's claim 14, the subscript "n" is not zero since the claims state that bifunctional sequence C is linked to A<sup>2</sup>. The rejection fails to demonstrate where Truc et al. disclose the features recited in claim 14, and thus also fails to establish anticipation of this claim.

**Rejection under 35 USC 103(a) in view of Anselmann et al. and Trau et al.**

Claims 10-16 are rejected as allegedly being obvious under 35 USC 103(a) in view of Anselmann et al. (US 6,302,926) and Trau et al. (US 2003/0124564). This rejection is traversed.

The disclosures of Anselmann et al. and Trau et al. are discussed above. Neither

Anselmann et al. nor Truc et al. disclose a process wherein hydrolytic polycondensation of tetraalkoxysilanes and/or organotrialkoxysilanes is performed in a medium comprising water, one or more solubilizers, and an amine, namely aminoethanol or ethylenediamine.

Further, the rejection fails to demonstrate how either Anselmann et al. and Trau et al. disclose or suggest a bifunctional sequence C linked to a group A<sup>2</sup> in accordance with applicant's claim 14.

In view of the above remarks, it is respectfully submitted that the disclosure of Anselmann et al., taken alone or in combination with that of Trau et al., fails to render obvious applicant's claimed invention. Withdrawal of the rejection is respectfully requested.

**Rejection under 35 USC 103(a) in view of Unger et al. and Trau et al.**

Claims 10-16 are rejected as allegedly being obvious under 35 USC 103(a) in view of Unger et al. (US 4,775,520) and Trau et al. (US 2003/0124564). This rejection is traversed.

The disclosures of Unger et al. and Trau et al. are discussed above. Neither Unger et al. nor Truc et al. disclose a process wherein hydrolytic polycondensation of tetraalkoxysilanes and/or organotrialkoxysilanes is performed in a medium comprising water, one or more solubilizers, and an amine, namely aminoethanol or ethylenediamine.

Further, the rejection fails to demonstrate how either Unger et al. and Trau et al. disclose or suggest a bifunctional sequence C linked to a group A<sup>2</sup> in accordance with applicant's claim 14.

In view of the above remarks, it is respectfully submitted that the disclosure of Unger et al., taken alone or in combination with that of Trau et al., fails to render obvious applicant's claimed invention. Withdrawal of the rejection is respectfully requested.

**Rejection under 35 USC 103(a) in view of Anselmann et al., Kohlschutter et al. and Su**

Claims 3, 4, and 6 are rejected as allegedly being obvious under 35 USC 103(a) in view of Anselmann et al., Kohlschutter et al. (US 3,922,392) and Su (US 5,932,168).

Firstly, it is noted that this rejection is not applied against original claim 5 which recited an amine selected from aminoethanol, ethylenediamine, octylamine and diethylenetriamine. All the claims now recite that the amine is aminoethanol or ethylenediamine. Thus, this rejection is rendered moot by the amendments to claim 1.

Kohlschutter et al. disclose a process wherein nonporous materials are coated with a **porous** silicon dioxide layer. In the process, the nonporous material is coated with a polymeric alkoxysiloxane, and is then subjected to hydrolytic polycondensation using an aqueous basis solution. The nonporous materials are solid substances which are insoluble and non-swellable in water, e.g., an inorganic material such as glass, having a particle size of about 1 to 500  $\mu$ . See column 1, lines 45-65. The polyalkoxysiloxane can be formulated into a solution using a solvent such as dichloromethane, and the nonporous material can then be introduced into the solution. See, e.g., column 3, lines 16-29.

After the particles are coated, they are then subjected to hydrolytic polycondensation, wherein hydrolysis and condensation occur simultaneously, using an excess of water in the presence of hydroxyl ions. The substance used to provide the hydroxyl ions are bases, preferably alkaline hydroxides, with ammonium hydroxide and sodium hydroxide are preferred, in this connection, because they are readily accessible technically. Other basic compounds disclosed by Kohlschutter et al. methyldimethylamine, trimethylamine, and urotropine (hexamethylenetetramine).

Kohlschutter et al. do not disclose or suggest the use of the amines recited in applicant's claims. Moreover, as the process of Kohlschutter et al. is directed to the formation of a porous layer on particles, the disclosure provides no suggestion as to how to modify a process for making non-porous particles such as described by Anselmann et al. It is noted that the motivation stated in the rejection for combining the Kohlschutter et al. with that of Anselmann et al. relates to changing pore diameter and volume. However, since the material of Anselmann et al. is non-porous, the asserted motivation is not relevant to the disclosure of Anselmann et al.

Su et al. is relied on for the disclosure at column 5, lines 52-67. This portion of the disclosure describes the base used for hydrolyzing an alkoxy silane in "Step A" of a method for synthesizing a mullite precursor sol. The base is said to also act as a catalyst for the hydrolysis of the alkoxy silane compound. Su et al. disclose that suitable bases are ammonium hydroxide, diethylamine, dimethylamine, N-(2-hydroxyethyl)ethylenediamine, trimethanolamine, triethanolamine, bis-(2-hydroxyethyl)butylamine, allylmethylamine, butyldimethylamine, dibutylmethylamine, 2,2',2"-trihydroxyamine, and combinations thereof.

The so-called "Step A" involves mixing together water, and ammonium hydroxide.

The resultant mixture is then stirred overnight to make a silica sol, i.e., Step B. In Step C, the silica sol is combined with an aqueous solution of aluminum nitrate nonahydrate. Finally, the mixture of the silica sol and aqueous aluminum nitrate nonahydrate solution is mixed overnight to make a mullite precursor sol, having a pH of less than about 2, i.e., Step D. The disclosure of Su et al. relates to a process for making a mullite sol, and thus does not suggest that bases are equivalent for a different process.

Furthermore, neither Anselmann et al. nor Kohlschutter et al. or Su disclose a process wherein hydrolytic polycondensation of tetraalkoxysilanes and/or organotrialkoxysilanes is performed in a medium comprising water, one or more solubilizers, and either aminoethanol or ethylenediamine.

In view of the above remarks, it is respectfully submitted that the disclosure of Anselmann et al., taken alone or in combination with that of Kohlschutter et al. and/or Su, fails to render obvious applicant's claimed invention. Withdrawal of the rejection is respectfully requested.

**Rejection under 35 USC 103(a) in view of Anselmann et al and Yamaya et al.**

Claims 3-5 are rejected as allegedly being obvious under 35 USC 103(a) in view of Anselmann et al. and Yamaya et al. (US 2003/0087102).

The disclosure of Anselmann et al. is discussed above. Beginning at paragraph [0032], Yamaya et al. disclose a process for preparing a radiation-polymerizable composition (A). The process involves hydrolyzing: (a) a (meth)acryl functional group-bearing organosilicon compound of the formula (1)  $A-SiR''_aX_{3-a}$  (A being a (meth)acryl functional substituent-bearing organic group,  $R''$  being a monovalent hydrocarbon group, X being a hydrolyzable group, and a being an integer from 0 to 2); and (b) a hydrolyzable organosilicon compound of the formula  $R'_pSiR''_qX_{4-p-q}$  ( $R'$  being a (meth)acryl functional substituent-lacking organic group,  $R''$  and X are as defined above, p and q being integers from 0 to 3, and the sum  $p+q$  being 0 to 3).

At paragraph [0045], Yamaya et al. disclose condensation reaction promoters (catalysts) that can be used for the hydrolysis process for preparing the radiation-polymerizable composition (A). These catalysts include generally acids, bases, fluorides, metal salts of organic carboxylic acids, organometallic compounds, and aminoalkyl-

substituted alkoxysilanes. Among the specific catalysts mentioned are the bases NaOH, ammonia, triethylamine, dibutylamine, hexylamine, octylamine, benzyltriethylammonium chloride, and tetramethylammonium hydroxide.

It is evident that Yamaya et al.'s disclosure relates to a different hydrolysis process than that of Anselmann et al. since, for example, it involves the presence of a (meth)acryl functional group-bearing organosilicon compound. Thus, Yamaya et al. provide no motivation to modify the process of Anselmann et al.

Furthermore, neither Anselmann et al. nor Yamaya et al. disclose a process wherein hydrolytic polycondensation of tetraalkoxysilanes and/or organotrialkoxysilanes is performed in a medium comprising water, one or more solubilizers, and either aminoethanol or ethylenediamine.

In view of the above remarks, it is respectfully submitted that the disclosure of Anselmann et al., taken alone or in combination with that of Yamaya et al., fails to render obvious applicant's claimed invention. Withdrawal of the rejection is respectfully requested.

**Rejection under 35 USC 103(a) in view of Unger et al., Kohlschutter et al. and Su**

Claims 3, 4, and 6 are rejected as allegedly being obvious under 35 USC 103(a) in view of Unger et al., Kohlschutter et al. (US 3,922,392) and Su (US 5,932,168).

It is noted that this rejection also is not applied against original claim 5 which recited an amine selected from aminoethanol, ethylenediamine, octylamine and diethylenetriamine. All the claims now recite that the amine is aminoethanol or ethylenediamine. Thus, this rejection is rendered moot by the amendments to claim 1.

The disclosures of Unger et al., Kohlschutter et al., and Su are all discussed above. Kohlschutter et al. do not disclose or suggest the use of the amines recited in applicant's claims. Moreover, as the process of Kohlschutter et al. is directed to the formation of a porous layer on particles, the disclosure provides no suggestion as to how to modify a process for making non-porous particles such as described by Unger et al. It is noted that the motivation stated in the rejection for combining the Kohlschutter et al. with that of Unger et al. relates to changing pore diameter and volume. However, since the material of Unger et al. is non-porous, the asserted motivation is not relevant to the disclosure of Unger et al.

As for Su et al., the disclosure relates to a process for making a mullite sol, and thus

does not suggest that bases are equivalent for a different process.

Furthermore, neither Unger et al. nor Kohlschutter et al. or Su disclose a process wherein hydrolytic polycondensation of tetraalkoxysilanes and/or organotrialkoxysilanes is performed in a medium comprising water, one or more solubilizers, and either aminoethanol or ethylenediamine.

In view of the above remarks, it is respectfully submitted that the disclosure of Unger et al., taken alone or in combination with that of Kohlschutter et al. and/or Su, fails to render obvious applicant's claimed invention. Withdrawal of the rejection is respectfully requested.

**Rejection under 35 USC 103(a) in view of Unger et al and Yamaya et al.**

Claims 3-5 are rejected as allegedly being obvious under 35 USC 103(a) in view of Unger et al. and Yamaya et al. (US 2003/0087102).

The disclosures of Unger et al. and Yamaya et al. are discussed above. Yamaya et al.'s disclosure relates to a different hydrolysis process than that of Unger et al. since, for example, it involves the presence of a (meth)acryl functional group-bearing organosilicon compound. Thus, Yamaya et al. provide no motivation to modify the process of Unger et al.

Furthermore, neither Unger et al. nor Yamaya et al. disclose a process wherein hydrolytic polycondensation of tetraalkoxysilanes and/or organotrialkoxysilanes is performed in a medium comprising water, one or more solubilizers, and either aminoethanol or ethylenediamine.

In view of the above remarks, it is respectfully submitted that the disclosure of Unger et al., taken alone or in combination with that of Yamaya et al., fails to render obvious applicant's claimed invention. Withdrawal of the rejection is respectfully requested.



The Commissioner is hereby authorized to charge any fees associated with this response or credit any overpayment to Deposit Account No. 13-3402.

Respectfully submitted,

/Brion P. Heaney/

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